REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated January 25, 2006 (U.S. Patent Office Paper No. 20060112). In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Record of Interview

On May 25, 2006, an interview was conducted by telephone between Examiner Hanh Phan and Yukiko O. Maekawa, Reg. No. 50307. Applicants thank the Examiner for granting this interview. Applicants also thank that the Examiner for acknowledging that the proposed amended claims are distinguishable from the prior art cited in the Office Action.

Status of the Claims

As outlined above, claims 12-18 stand for consideration in this application, while claims 12-13 are being amended to correct formal errors and to more particularly point out and distinctly claim the subject invention. Claim 19 stands withdrawn from consideration in this application. In addition, new claims 20-21 are hereby submitted for consideration. All amendments to the application are fully supported therein. Applicant hereby submits that no new matter is being introduced into the application through the submission of this response.

Prior Art Rejections

35 U.S.C. §102(b) rejection

Claims 13-17 were rejected under 35 U.S.C. §102(b) as being anticipated by Yoshimura et al. (US Pat. No. 5,835,646). Applicants respectfully traverse the rejection of claims 13-17 for the reasons set forth below.

According to the M.P.E.P. §2131, a claim is anticipated under 35 U.S.C. §102 (a), (b), and (e) only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.

Claim 13

The Office Action contends that Yoshimura teaches in Fig. 1C that an optical receiver, comprising: a light receiving element (i.e. photodiode PD in Fig. 1C) disposed on a first substrate; a high-frequency line disposed on a second substrate (Fig. 1C) separated from the first substrate; and a traveling-wave optical modulator (Fig. 1C) in which an electrode used for detecting an electric output of the light receiving element is electrically connected to the high-frequency line, said electrode being included in the light receiving element. Applicants respectfully disagree.

The present invention as now recited in claim 13 provides that an optical receiver comprising a light receiving element disposed on a first substrate; a high-frequency line disposed on a second substrate separated from the first substrate; and a traveling-wave optical modulator in which an electrode used for detecting an electric output of the light receiving element is electrically connected to the high-frequency line.

Among the features of the present invention as recited in claim 13, the traveling-wave optical modulator comprises optical interference waveguides and a plurality of separated electrodes being disposed on the optical interference waveguides cyclically, the high-frequency line having a plurality of separated electrodes cyclically on a part of the high-frequency line corresponding to the traveling-wave optical modulator, and the first substrate being fixedly secured to the second substrate with an active layer side of the light receiving element disposed on the first substrate and a high-frequency line side of the second substrate facing each other so that each of the separated electrode disposed on the optical interference wave guide is fixedly secured on the high-frequency line through the corresponding separated electrode disposed on high-frequency line.

The optical receiver of the present invention is designed based on the concept of a "distributed constant circuit." For example, Figs. 1A-1C describe that the optical receiver of the present invention employs a plurality of separated electrodes 105 (solders) on a high-frequency line 102 and a plurality of separated electrodes 203 on an optical interference waveguide. Furthermore, the external semiconductor disposed on a first substrate that has a plurality of separated electrode disposed cyclically and a high-frequency line disposed on a second substrate has a plurality of separated solders being disposed cyclically on a part of the high-frequency line corresponding to the external semiconductor modulator. Figs. 3A-3C, Figs. 4A-4C, Figs. 6A-6C, Figs. 7A-7C also describe the similar features. This structure is a

so-called capacitive load structure in which capacitive components are disposed at regular intervals on the high-frequency-line. (See paragraph [0031] of the specification)

In contrast, Yoshimura merely shows that an active optical circuit sheet or board is configured by junction down mounting. Contrary to the Office Action, Figs. 1(a)-1(c) in Yoshimura do not show a high-frequency line disposed on a second substrate nor a traveling-wave optical modulator. These figures merely show that an electrical signal converted from an optical signal by the photodiode is inputted to the electrical circuit board by contacting the electrodes of the optical modulator with the electrodes of an electric circuit board. (Also see col. 7. lines 1-10) More importantly, as the Examiner acknowledged in the interview, Yoshimura does not show that a plurality of separated electrodes 203 is disposed on an optical interference waveguide and plurality of separated solders is disposed cyclically on a part of the high-frequency line, because the circuit in Yoshimura is designed based on the concept of a "lumped constant circuit." A lumped constant circuit cannot be used at a high frequency. In contrast, a distributed circuit, which is used in the present invention as mentioned above, can be used at a high frequency because circuit elements per unit length are considered a circuit constant element.

Therefore, Yoshimura cannot and does not show every element recited in claim 13. Accordingly, claim 13 is not anticipated by Yoshimura.

Claims 14-17

As to dependent claims 14-17, the arguments set forth above with respect to independent claim 13 are equally applicable here. The base claim being allowable, claims 14-17 must also be allowable.

35 U.S.C. §103(a) rejection

Claims 12 and 18 were rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Mirshekar-Syahkal et al. (Pub. NO. 2002/0109897 A1) in view of Yoshimura. This rejection is respectfully traversed for the reasons set forth below.

According to the Manual of Patent Examining Procedure (M.P.E.P. §2143),

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in

the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both not found in the prior art, not in the applicant's disclosure.

Claim 12

The Office Action contends that Mirshekar-Syahkal teaches in Figs. 2, 5, and 6 that a an optical transmitter, comprising: a semiconductor laser light source (i.e. laser light source 208); and a traveling-wave optical modulator (i.e. optical modulator 504) for modulating output light of the semiconductor laser light source, wherein said traveling-wave optical modulator (504) comprises an external semiconductor modulator disposed on a first substrate (i.e. substrate 520), said external semiconductor modulator (504) being capable of modulating output light of the semiconductor laser light source, and a high-frequency line (i.e. a high frequency line 506) disposed on a second substrate (i.e. substrate 502) separated from the first substrate, and in said traveling-wave optical modulator, a control electrode for the external semiconductor modulator, which is included in the external semiconductor modulator, is electrically connected to the high-frequency line.

The Office Action admitted that Mirshekar-Syahkal fails to specifically teach the first substrate is fixed secured to the second substrate with an active layer side of the external semiconductor modulator disposed on the first substrate and a high-frequency line side of the second substrate facing each other, and an optical receiver comprising a light receiving element disposed on a third substrate; a high-frequency line disposed on a fourth substrate separated from the third substrate; and a traveling-wave optical modulator in which an electrode used for detecting an electric output of the light receiving element is electrically connected to the high-frequency line, said electrode being included in the light receiving element, wherein the third substrate is fixedly secured to the fourth substrate with an active layer side of the light receiving element disposed on the third substrate and a high-frequency line side of the fourth substrate facing each other.

The Office Action further contends that Yoshimura teaches the limitation that Mirshekar-Syahkal fails to specifically teach, but that it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the limitation as

taught by Yoshimura into the system of Mirshekar-Syahkal. The Office Action further contends that one of ordinary skill in the art would be motivated to do this since Yoshimura suggests in co. 7, lines 1-10 that since the first substrate is fixedly secured to the second substrate with an active layer side of the external semiconductor modulator disposed on the first substrate and a high-frequency line side of the second substrate facing each other, and an optical receiver comprising a light receiving element disposed on a third substrate, a high-frequency line disposed on a fourth substrate separated from the first semiconductor substrate, and a traveling-wave optical modulator in which an electrode used for detecting an electrode output of the light receiving element is electrically connected to the high-frequency line, the electrode being included in the light receiving element, wherein the third substrate is fixedly secured to the fourth substrate with an active layer side of the light receiving element disposed on the third substrate and a high-frequency line side of the fourth substrate facing each other have the advantage of providing an optical communication system with high capacity and high speed and of reducing the size, weight and cost of the device. Applicants respectfully disagree.

The distinctive features of the present invention as recited in claim 12 are in each of an optical modulator and an optical receiver, a plurality of separated electrodes are cyclically disposed on the optical interference waveguides in the traveling-wave optical modulator, the high-frequency line in an optical receiver has a plurality of separated electrodes cyclically on a part of the high-frequency line corresponding to the traveling-wave optical modulator, and the first substrate is fixedly secured to the second substrate with an active layer side of the light receiving element disposed on the first substrate and a high-frequency line side of the second substrate facing each other so that each of the separated electrode disposed on the optical interference waveguide is fixedly secured on the high-frequency line through the corresponding separated electrode disposed on high-frequency line each other.

Mirshekar-Syahkal merely shows that high speed optical modulation is achieved by utilizing an electrical transmission line having a characteristic impedance less than 50 ohm impedance. (See [0008]) However, as the Examiner acknowledged in the interview, Mirshekar-Syahkal does not explicitly or implicitly teach or suggest that a plurality of separated electrodes are cyclically disposed on the optical interference waveguides in the traveling-wave optical modulator and the high-frequency line has a plurality of separated electrodes cyclically on a part of the high-frequency line corresponding to the traveling-wave optical modulator in order to achieve phase matching for high speed optical communication.

Furthermore, as set forth above, Yoshimura does not explicitly or implicitly teach or suggest these features.

Furthermore, there is no suggestion or motivation in either Mirshekar-Syahkal or Yoshimura to combine these features explicitly or implicitly, or in the knowledge generally available to one of ordinary skill in the art at the time the invention was made to embody all the features of the invention as recited in claim 12. Accordingly, claim 12 is not obvious in view of all the prior art.

Claim 18

As to dependent claim 18, the arguments set forth above with respect to independent claim 12 are equally applicable here. The base claim being allowable, claim 18 must also be allowable.

Conclusion

In view of all the above, Applicants respectfully submit that certain clear and distinct differences as discussed exist between the present invention as now claimed and the prior art references upon which the rejections in the Office Action rely. These differences are more than sufficient that the present invention as now claimed would not have been anticipated nor rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the

prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and telephone number indicated below.

Respectfully submitted,

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